



LESSON 1:

Electricity is All Around You

There aren't a lot of places that you can see electricity. The most common form of electricity you may know is lightning. Lightning is a big spark that occurs when lots of electrons move from one place to another very quickly. An **electron** is a tiny piece of electricity, too small to see even with a powerful microscope.

Even though we may not realize it, electricity is everywhere. There is even electricity everywhere in space. There are electrons inside stars and on all planets. Lightning is just one expression of natural electricity. Inside your body, even your thoughts are very small bursts of electricity traveling along your nerves and between cells in your brain.

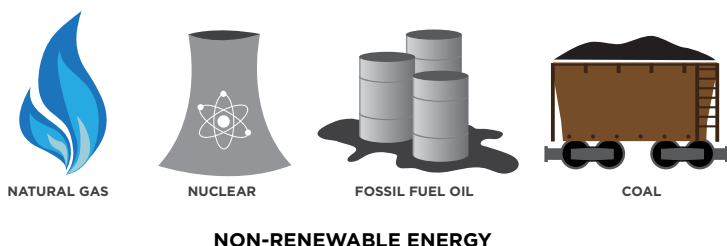
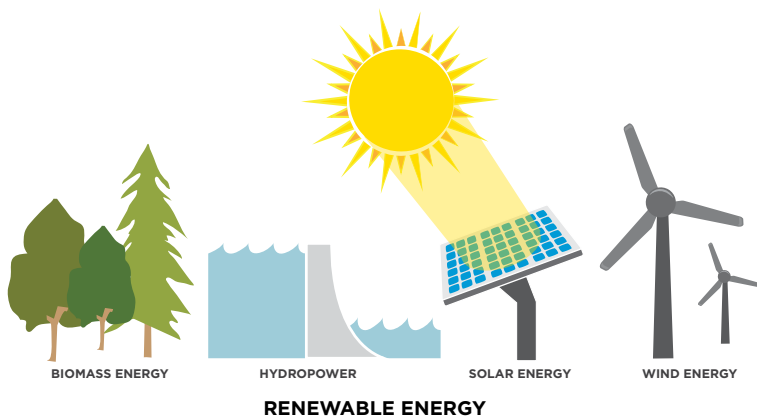
Without electricity, you would not be able to read this article right now. Your nervous system sends

POWER
SAVE
TEXAS

“signals” to the brain, telling our eyes to follow the words on the page. These signals are little bursts of electricity that carry messages from one point to another within our body. With so much electricity jumping around, it may seem like the body is a really great power source. But, the human body generates only about 0.1 volts—not even enough to power your TV remote.¹

It’s easy to see the uses of electricity around you. When electricity is captured, it is constantly flowing through insulated wires. These wires bring power to your home and your town. As the population of Texas grows, so does the need for electricity. Texas currently creates and uses more electricity than any other state.²

The good news is Texas has a variety of climates and natural resources.



Texans can take advantage of these resources to help generate electricity. When we talk about using **renewable resources** to create energy, we mean using they power created from the use of natural resources, which replace themselves quickly and dependably. These energy sources can never be used up, like sunlight and wind. Renewable energy is clean and is considered unlimited. When we use these resources, we reduce the demand for **non-renewable sources** of energy. The non-renewable resources are formed deep within the earth from plant and animal remains and are millions of years old, like coal and oil. These resources can only be used once for energy.³

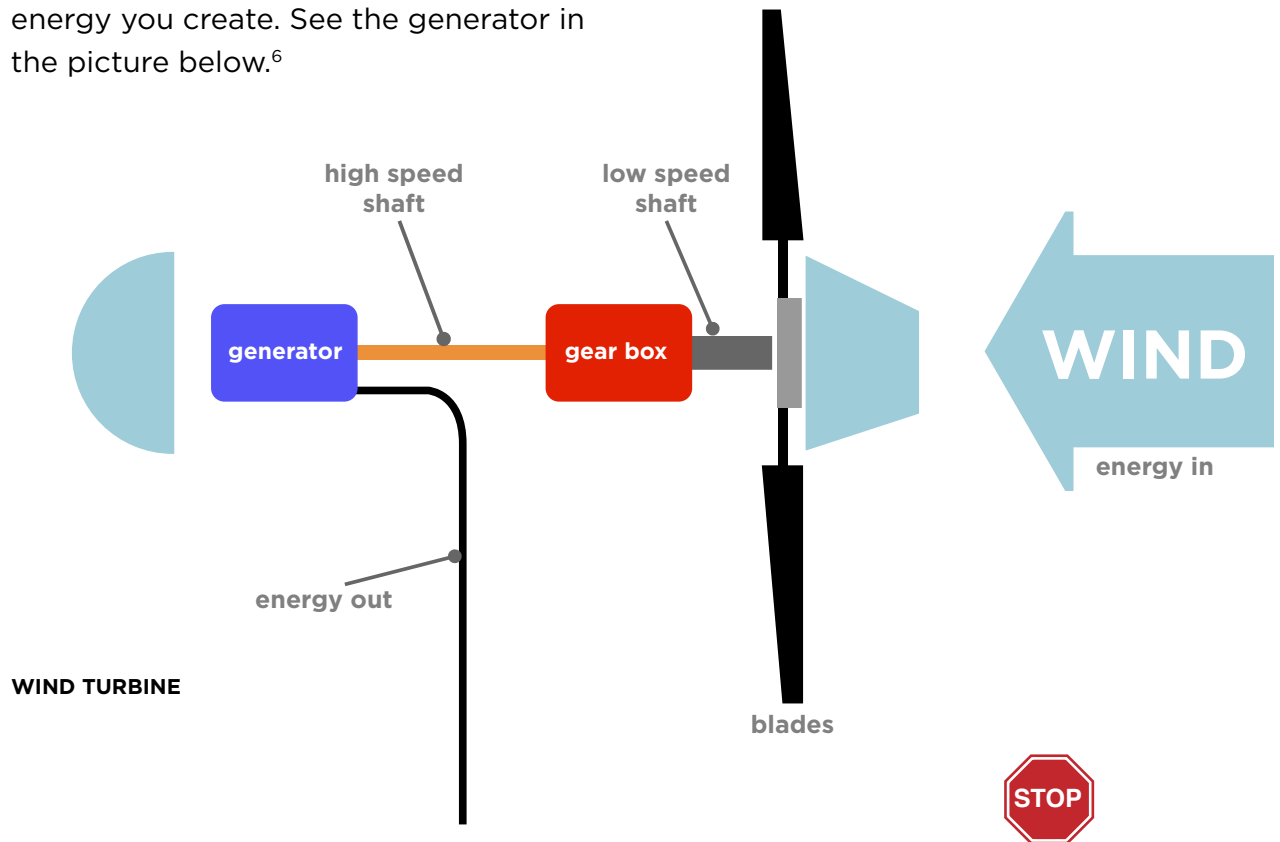
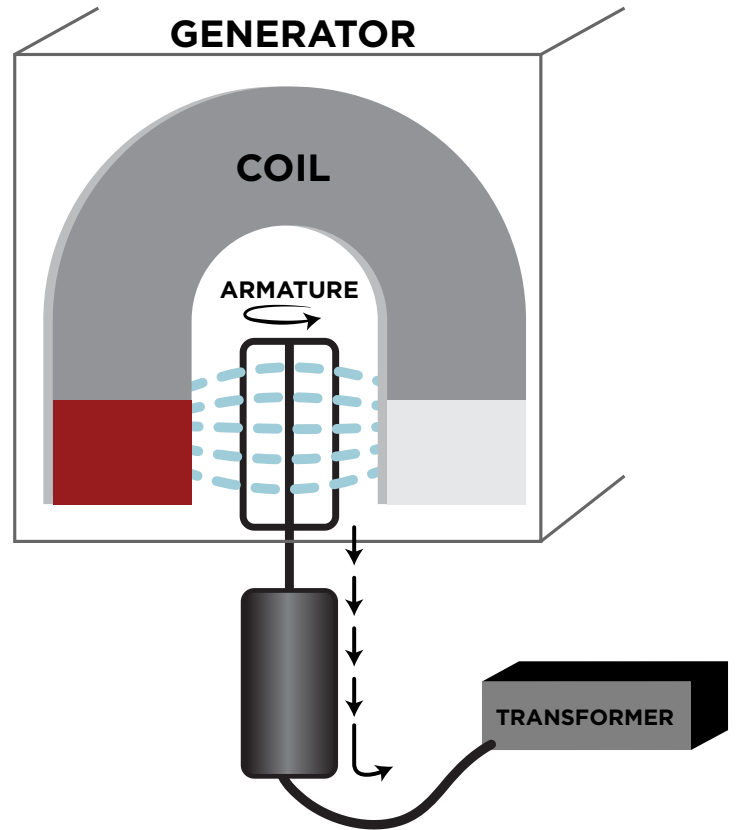


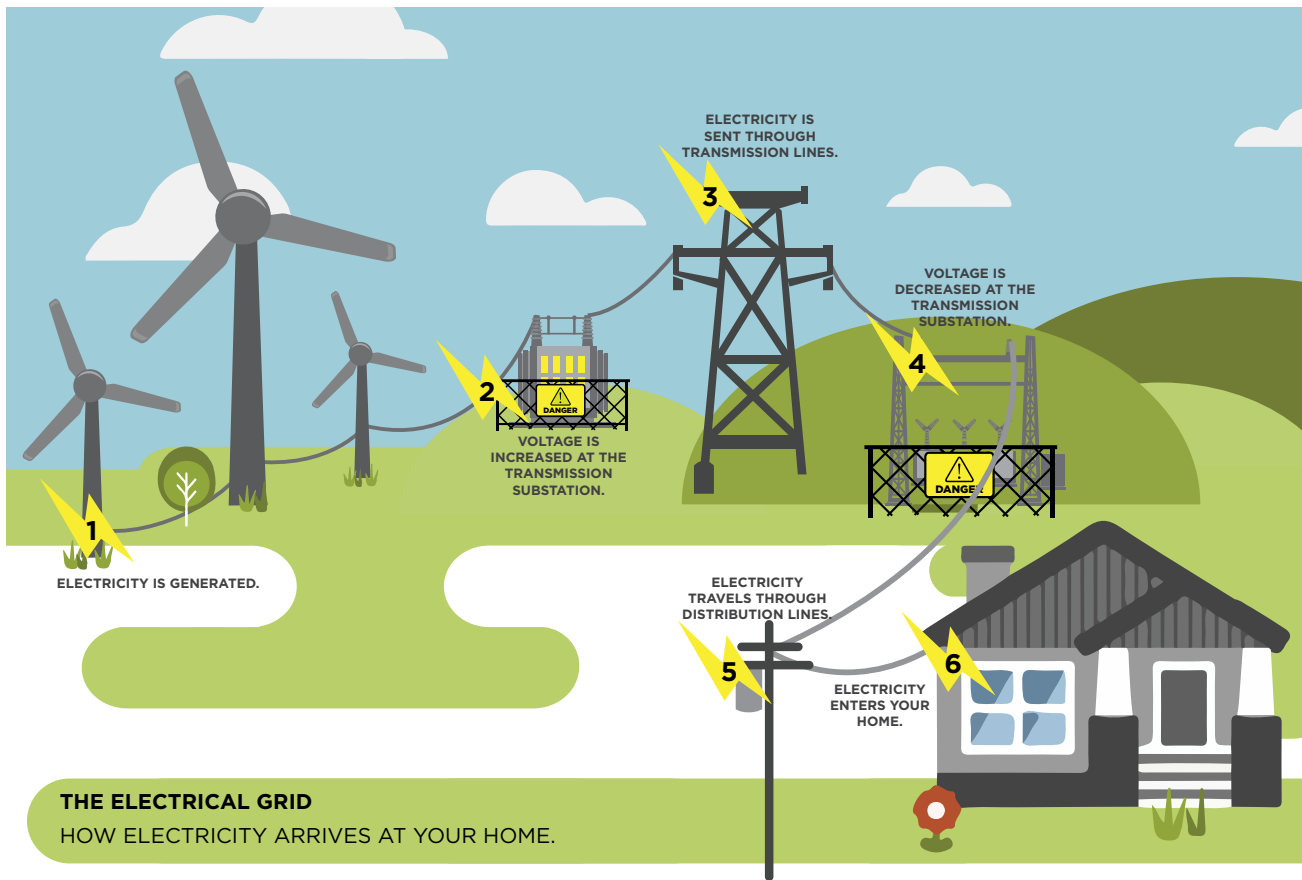
Everyone can enjoy renewable energy, and some even install their own solar panels or wind turbines to generate power for themselves. This is called **Distributed Renewable Generation**, or a DRG system.⁴ At times, these customers produce more power than they can use. Depending on where the customers live, this extra power may be sold back to an electric company.

When we talk about electrical power, you may wonder how electricity was captured and forced to travel through the power lines. We really depend on this form of energy, and without it our world would be very different; we would be much less comfortable. If we were without electricity for a long time, water could not be pumped into our homes.

When you think about ways to create or make electricity, you are talking about **electric generation**. Most of the ways to do this involve a machine called a **generator**. The generator transfers the energy of motion into electricity. Take a look at the picture on the right.⁵ A magnetic coil is located inside the generator. An armature spins in between the magnetic coil. This spinning action creates electricity.

You might wonder if it is hard to make the armature spin. The good news is, it's not hard at all. In fact, there are many ways of spinning the armature that you may already know about! These include using the power of the wind, water, or sun, and also by using something called biomass. We will learn about biomass in Lesson 4. The bigger the generator, the faster the armature spins, and the more energy you create. See the generator in the picture below.⁶





In the case of a wind turbine, these turbines work the opposite of a fan. Instead of using electricity to make wind, these turbines use wind to make electricity. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity.

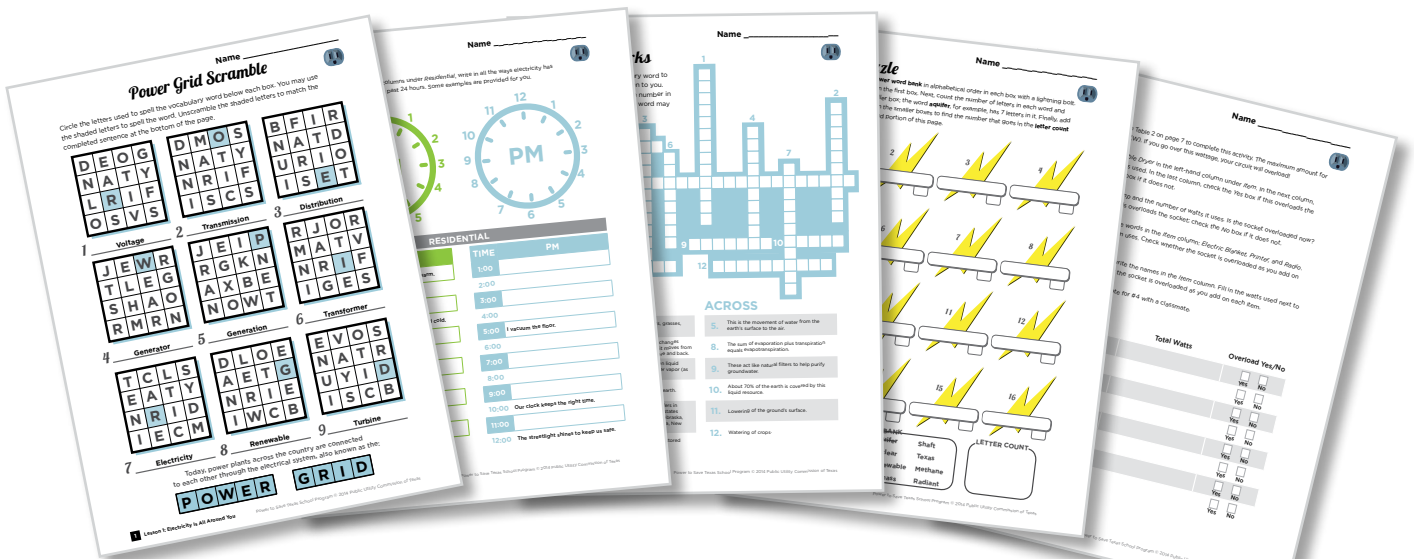
The state of Texas is unique. Texas is able to rely on many sources for generating its own electrical power. We will read about these in the next lesson.

Electricity is an enormous part of our lives. It makes our lives comfortable and safe. Electricity is so important that most of the time we simply take it for granted. Do you know how electricity reaches your home or school? Actually, it travels a long way. The power plant where your electricity is made

or generated might be hundreds of miles away!

First, (1) the electricity is generated by using either renewable or non-renewable resources. Second, (2) the voltage is increased at a transmission substation. Then, (3) the electricity is sent through uninsulated transmission lines on very high poles or structures to a distribution substation (4) where the voltage is decreased. Next, the electricity is carried to individual neighborhoods by distribution lines that are held up on power poles or buried deep underground. Before reaching your home, (5) smaller transformers decrease the voltage one more time. Finally, (6) electricity safely arrives at your home for you to use.⁷









Power Grid Scramble

Ask your teacher for the Power Grid Scramble activity. You will receive one of three versions. The Power Grid Scramble uses vocabulary words from a word bank to spell, unscramble, match, or complete sentences.

Long-Term Savings for Homes Tips

COMPUTERS, APPLIANCES & ELECTRONICS

-  Set your computer and monitor to sleep when idle for more than a few minutes.
-  Don't use screen savers. They prevent computers and monitors from going into power-saver mode.
-  Make sure the dryer air vent outside your house is properly sealed.
-  When buying a new appliance, look for ENERGY STAR® qualified products. These options use 10-50% less energy than standard models.

See more at www.powertosavetexas.org.

Scan this QR Code with your smartphone to visit the program website.



Career Connection / Job Profile:



Do you like helping people?

Are you interested in how electrical equipment works?

Are you good at fixing things?

If you answered, “Yes,” to these questions, you might like to be a line installer and repairer, also known as a lineman. Line installers and repairers build, maintain, and repair electrical power systems and cables. Some install and fix the power lines that move electricity from power plants to customers. Others work on the lines and cables that carry telephone service, television, and the Internet.

As a line installer and repairer you would:

- Install, maintain, and fix power lines, cables, and poles.
- Set up cable service for customers and explain how it works.
- Drive work trucks to job sites and coordinate jobs with other workers.
- Dig holes, set poles, and climb poles or use lifts to reach equipment.
- String lines and cables between poles, towers, and buildings.
- Dig trenches and lay cable into trenches.
- Inspect and test lines, electric parts, and signal strength.
- Check lines and poles from helicopters or airplanes to get clear views.
- Use power tools and equipment to install and fix poles and lines.
- Follow rules to keep workplaces safe and keep tools in good repair.

Will There Be Jobs in the Future?

In Texas, this occupation has high growth potential. Nationally, this occupation is growing at an average rate.

Education Required:

To work as a line installer, you typically need to:

- Have a high school diploma or GED; and
- Complete an apprenticeship program or long-term, on-the-job training.

Provided courtesy of: www.onetonline.org

Career Connection / Job Profile:



Are you good at math?

Are you interested in helping keep people safe?

Are you organized and able to focus on tasks?

If you answered, “Yes,” to these questions, you might like to be an environmental scientist. Environmental scientists study problems in the natural world. They measure electromagnetic fields; do research about how these problems affect the health of people, plants, and animals in order to protect them. Many environmental scientists work for federal, state, and local governments. Others work for companies that help clients plan projects and solve problems.

As an environmental scientist you would:

- Study how what people do affects the world around them.
- Do research and create programs that limit harm to land, water, and air.
- Collect water, soil, or air samples and test them.
- Suggest ways to use land that will help clean and protect it.
- Prepare permits and codes to protect the land, water, and air.
- Inspect sites and decide what to do if codes have not been followed.
- Give advice to clients, the government, and the public.
- Train students, other scientists, or staff.
- Meet with clients, staff, or the public to explain research findings.
- Write reports and make charts or graphs to help explain research.

Will There Be Jobs in the Future?

In Texas and nationally, this occupation is growing at an average rate.

Education Required:

To work as an environmental scientist, you typically need to:

- Have a high school diploma or GED; and
- Have a college degree in science.

Provided courtesy of: www.onetonline.org